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ECONOMIC GEOLOGY OF
- A BRIEF OUTLINE OF THE ~~GEOLOGICAL HISTORY OF~~ -

THE NORTHWEST SHORE OF LAC LA RONGE

AND

THE BEAVER LAKE AREAS

By Professor J. B. Mawdsley
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NORTH WEST SHORE OF LAC LA RONGE

For a number of years metal mineralization has been known to occur on and in the vicinity of the north west shore of Lac la Ronge. This large lake is 130 miles north of the city of Prince Albert. It is roughly circular, has a diameter of about 20 miles, a deeply crenulated shore line in its northern part, and is here studded with islands.

In 1915 the Hall brothers uncovered heavy copper mineralization near the base of a peninsula, generally known as Moose Point, on the north west shore of the lake. Some interest was aroused but so far very little real prospecting has been done in this region. Although groups of claims have been staked at various times very few are now in good standing.

A section of country to the north and north east of the Hall copper showings was traversed, by a circuitous route, by the writer under the able guidance of Mr. Gordon Hall. In this locality a 3 mile wide belt of volcanics and related schists is flanked by intrusive syenites and granites as well as by narrower parallel belts of similar greenstones and their metamorphic equivalents. The main belt of volcanics is intruded by dykes of a grey feldspar porphyry and quartz veins, probably related to the porphyry. Metal sulphides are in places associated with these veins and have yielded values in gold. Strong and wide shearings are present and quartz free sulphide mineralizations of no value have already been uncovered in them. The present known conditions in this belt, whose full extent is yet unknown, are distinctly encouraging. It is quite possible that the thorough prospecting of this region may result in the discovery of concentrations of copper bearing sulphides similar to the ones on the interesting Hall property, or valuable gold bearing quartz veins, or both. A much less favorable area, immediately south west of Moose Point, was also studied and will be referred to later.

An excellent map of the Lac la Ronge area, on a scale of 4 miles to 1 inch, is available from the Topographical Survey of Canada, Ottawa. For easy reference this map is divided off into numbered squares and in the following sections localities will be referred to by these numbers.

The trend of the volcanic and schist formations in the Lac la Ronge area closely parallel that of the gneissic structures of the associated intrusive syenites and granites. The directions of the schisting and gneissic structures of these formations have strongly influenced the location and configuration of the numerous bodies of water and the points and chains of islands in them. A study of these physiographic features gives a clear idea of the regional structure present. The chains of islands, points, bays and water courses of the north west shore of Lac la Ronge have a general north east - south west trend and correspond to the direction of the formations present and their structures.

The north west part of the lake's shore line is divided by irregular points into three major bays which are parallel to one another and have the regional trend. The northernmost, Waden Bay (locally known as Lynx Bay) (S.E. 1/4, 347,82), is 4 miles long and a little more than half this distance in width. Into this bay from the west flows Nemeiben Creek. On the south west this bay is flanked by an irregular peninsula, having a maximum breadth of 3 miles, known locally as Moose Point. About two miles east of this point is an island 3 miles in length, Bear Island (N. 1/2 346,84), separated from the north shore by an island studded channel a mile wide. North east of Waden Bay and Moose Point and north of Bear Island the 3 mile wide belt of volcanic and schists and its subsidiary bands previously mentioned are known to be present.

Dog Lake Greenstone Belt

About 7 miles north of Bear Island is the center of an irregular shaped, narrow, 4 mile long lake known locally as Dog Lake (E. 1/2, 348,84). This lake lies within the main volcanic belt traversed and it will be convenient to refer to it as the Dog Lake Greenstone Belt. It would equally well be termed the Waden Bay Belt for this bay must be on the strike of this band, except that conditions there are not fully known and might prove not to be typical of that investigated in the vicinity of Dog Lake.

Fourteen miles due north of Bear Island and 7 miles north of Dog Lake is the 3 miles long, irregular shaped MacKay Lake (350,84). The country between the shores of Lac la Ronge, north of Bear Island, to a point 2 miles south east of MacKay Lake was investigated. Two water routes involving numerous portages lead into this section. One is from the extreme north east end of Waden Bay up a small creek (Lynx Creek) whose main branch, not shown on the map, turns west and drains a narrow 3 mile long, northeast-southwest trending Lake (Lynx Lake) (W. 1/2, 348,84). North east of Bear Island is a large bay in the north shore of Lac la Ronge, known locally as Pipestone Bay. At the head of a deep northerly trending crenulation of this bay, about 6 miles north east of Bear Island (S.W. 1/4, 348,85), the second route enters the region.

The rocks in the vicinity of MacKay Lake are reported to be granites and granite gneisses cut in places by coarse pegmatite dykes. Two miles south east of MacKay Lake is a 2 mile long, V-shaped body of water, the arms of which point south, known locally as Athapapuskow Lake (N.W. 1/4, 349,85). On the west shore and the west side of the northerly trending central point of land, syenites, granite and related gneisses outcrop. In one place these rock types, which are marginal phases of the MacKay Lake granitic mass, are cut by a light coloured, fine grained aplite dyke. On the east side of this lake glistening looking altered volcanics are present. Intermediate outcrops are of more altered volcanics and hornblende rich rocks are present. Two miles southwest of the south west bay of this body of water is a small oval lake (extreme N. part of N.E. 1/4, 348,84). Along its north shore is the continuation of the southern contact of the MacKay Lake granitic mass and at this locality it trends south west. This geological boundary was not followed further. At this point syenite and a contact breccia of altered volcanic fragments involved in this syenite are present. The syenite borders the north west side of a 3 mile wide belt of volcanics and schists. The south east boundary, which parallels the previous one, was crossed on a small lake south east of the last mentioned lake (S. 1/2 of line 348,84,85). Between these two small bodies of water and in the center of this volcanic and schist belt is the 4 mile long, narrow, many bayed, Dog lake (E. 1/2, 348,84).

The north west margin of this greenstone belt is bordered by a narrow band of schists which grade rapidly into the central typical "greenstone" volcanics. In the south western two-fifths of the belt the volcanics are altered grading towards the south east margin into typical schists, which in the same direction pass finally into a granite gneiss.

The "greenstone" volcanics are predominantly andesites, greenish in colour due to the development of chlorite. Darker basalts and grey, cherty looking rhyolite types are sparingly present. Towards the north west side of this belt these volcanics are comparatively massive, but elsewhere are often strongly sheared and in places are typical chlorite schists. A few bands of what are apparently fine ash rocks (tuffs), resembling slates, are interbedded with the flows. True sediments were not seen. Where more altered, due to the metamorphic action of the intruding granitic rocks, the volcanics have a glistening appearance; this is especially true of the lighter grey rhyolite types, while the andesites and basalts tend to be rich in the black mineral hornblende. The highly altered equivalents of these rocks, predominating on

the south east side of this belt, are dark biotite schists and these grade imperceptibly into light coloured syenite and granite gneisses. These last intrusive rock types are definitely younger than the volcanics and have invaded them chiefly by molecular replacement, which accounts for the gradation often seen near the contacts. As previously noted intrusive breccia was nevertheless seen on the north east contact of the volcanic belt.

The shearing in this belt is predominantly parallel to the north east-southwest direction of the belt and dips at 65 to 75 degrees to the north west. At two places the sheared material shows conspicuous drag folding and the rocks on the north west side of these two zones in both cases have moved north east as compared with the rocks on the south east side. The axis of the drag folds have northerly dips and a north-south strike. These two localities are on Dog Lake, one at the bottom of the south west bay and the other on the east shore opposite the central narrows.

A medium grained, grey feldspar porphyry intrusive was seen in various outcrops in the greenstone belt studied. Most of them line up in a northeast-southwest direction paralleling the axis of the volcanic band and corresponding fairly closely to this axis. The southwesternmost outcrop noticed was on the north west end of the last portage on Lynx Creek 1/4 mile from Lynx Lake. The next is a mile to the north east in the deep bay on the east side of this lake. An equal distance in the same direction on the east shore of a small lake another outcrop occurs and also at a point 3 1/2 miles further in the same direction. This last one is on a northerly trending point in a bay on the east side of the long northern arm of Dog Lake. The first three of these outcrops are probably part of a linear body of this rock. North west of this line of outcrops ^{porphyry} syenite occurs on the lake north west of Dog Lake, lying on the south margin of the MacKay Lake granitic mass. To the south west of this line another outcrop occurs at the east end of the narrows in Dog Lake.

In the vicinity of most of these outcrops of feldspar porphyry quartz veins are present and in a couple of cases sulphides. It therefore seems highly probably that this rock type is the source of some or all of this mineralization and in this respect the association resembles that found in many metal mining regions.

The porphyry is believed to be younger than the granites and syenites found in the district but no evidence to support this was encountered. In places this rock type is sheared in a similar manner to the adjacent volcanics.

Sulphide and quartz mineralization was noticed at a number of points throughout the Dog Lake belt. In the north east part studied a heavily carbonated schist cut by a few barren stringers of white glassy quartz are present on the long point in the north west part of Athapapuskow Lake. About a mile a little south of east of this occurrence a little blasting has disclosed a similar quartz, cutting a massive hornblende rich rock mineralized with a little pyrite. About a mile south of the showing on the above lake, halfway down the creek joining it and flowing south into Dog Lake, the Flynn Saskatchewan Syndicate, in 1929, cut 3 short rock trenches spaced at intervals over a north east-southwest distance of 400 feet. These workings disclose a dark schist, probably a sheared tuff, containing a little disseminated pyrite and narrow bands of this mineral. With this sulphide is a little disseminated pyrrhotite and a few stringers of glassy white quartz. Similar shearing and mineralization is disclosed by a trench at a point about 1/2 a mile to the south west on the south east shore of a small oval lake (S.W. 1/4, 349,85). These two occurrences are probably not actually continuations of one another but lie in the same zone. One and a half miles, 20 degrees west of south of this last trench, on a northerly trending point in a bay on the west side of the north arm of Dog Lake, is a 100 foot trench having a northwest-southeast direction. This working discloses a slaty schist, probably a tuff, showing

drag folding and strongly gossan stained. At this point a narrow width of feldspar porphyry, as previously noted, is present. The mineralization is heavy, in places massive, and is practically all pyrrhotite with in places zones of fine siliceous material. Exceptions to this are two stringers, 2 and 4 inches wide respectively, of white glossy quartz containing a little pyrite. This quartz mineralization does not appear to be closely related to the pyrrhotite mineralization. In the narrows at the central point of Dog Lake in the vicinity of a feldspar porphyry dyke, also previously referred to and which has suffered shearing with the adjacent greenstones, narrow glassy white quartz veins cut the schists. Elsewhere in the belt narrow quartz veins were also noted.

The vein quartz in this area falls into two classes. A glassy white to almost colourless variety, a sample of which found at the site of the Flynn Saskatchewan Syndicate's Camp contained about 10 percent arsenopyrite and assayed 1.60 dollars in gold. The second type is greasy or glossy looking, white in colour, has a pronounced conchoidal fracture and is often drusy, the cavities containing aggregates of fine grained pyrite. A sample of this latter type containing about 10 percent of pyrite assayed 1.40 dollars in gold. This last mentioned variety resembles closely the gold bearing quartz occurring in certain sections of the Amisk area, particularly on the Kent property. It is as yet not clear if the two types of quartz in this area are of two separate ages or are related, it is suspected that the latter is the case.

Admittedly this belt is narrow but reported occurrences of mineralization in the vicinity of the Churchill River probably indicates that the belt extends in a north east direction for some miles. The schists mapped on Nemeiben Creek by McInnis and the reported occurrence of pyrrhotite on the large island in Waden Bay are probably continuations of this belt in a south west direction. Although no deposits of value have yet been located in this band, copper mineralization similar to that seen on Moose Point might conceivably be found, and although the assays for gold in the vein quartz mineralization assayed is disappointing it nevertheless indicates the presence of gold and favorable conditions in certain localities might have resulted in a valuable concentration of this material. The mineralized shear zones should be traced and investigated with a view to locating mineral bodies of interest. Very evidently little prospecting effort has so far been expended on this rather hopeful section.

Moose Point Belt of Schists

On the route from Pipestone Bay a band of gneissic granite and syenite a mile wide in contact with and paralleling the above belt of volcanics and schists was encountered. In its central part is a narrow strip of altered volcanics. To the south west of the gneisses and including the shore of Pipestone Bay, north east of Bear Island, greenstones and their schist equivalents are again present and have a combined width of about 1 1/2 miles. Further to the south east granitic gneisses are reported to again come in and form the predominant rock type found on the islands and east shore of Lac la Ronge.

In this last mentioned belt of greenstones and schists the schists greatly predominate. These rocks are known to extend to the south west for six miles to the shores of a bay 3 miles north east of the east end of Bear Island. This bay forms the deep indentation on the south east side of Moose Point which gives this tongue of land the form of a peninsula. For most of this distance the strike of these rocks is a few degrees south of west, but again strike south west in the vicinity of this bay. Some glistening, highly altered, but still recognizable volcanics are present near the head of this bay in the vicinity of the Halls' camp. These are flanked by dark biotite schists which grade imperceptibly laterally into light biotite syenite and granite gneisses. Pink fine grained aplite dykes cut the gneisses along the strike and are in turn cut by coarse pegmatite dykes. Odd barren veins of grey glassy quartz related to the pegmatite were also seen.

Hall Showings

In 1915 the Hall brothers discovered a copper bearing zone which they have traced for some thousands of feet north east of the bay on the south east side of Moose Point. Stripping and trenching has been done at various points and in 1929 the Consolidated Smelting and Mining Company of Canada had the property under option and drilled a few holes near the most promising trenches, later to be described. Eleven patented claims are now held by the original stakers, R. Hall, M.L.A., and G. Hall.

The copper bearing zone outcrops on this bay in the altered volcanic band and here is not in a strongly sheared zone. The sulphide mineralization is present in small pockets and stringers and the quantity is unimportant. About 6,000 feet north east of this bay are three rock trenches cut across the zone at intervals of 75 feet from one another. These workings disclose heavy copper mineralization. Owing to weathering a clear idea of the conditions present was not obtainable. In the northeasternmost trench a 4 foot width, in the second a 15 foot width and in the third, or southwesternmost, a 6 foot width bearing from 5 to 20 percent chalcopyrite, probably averaging 10% was seen. It is not clear that these sections form parts of one lense, it is suspected that probably two separate lenses are represented and that they are in echelon and parallel to one another. Bordering these zones there are widths of heavy gossan up to 15 feet wide and narrow parallel zones of gossan were also noticed a few feet from the sides of the main showings, or for some distance on their strike. Much of this gossan probably is above unweathered sulphides low or barren in chalcopyrite. The strike of the sulphide zone and including schists is north 35 degrees east and dip from 45 to 65 degrees to the north west. The wall rock in the trenches is so impregnated with rusty material that its original nature is now difficult to determine, but is believed to be dark impure quartzite.

Besides chalcopyrite, magnetite and colourless quartz are in places visible and in the leaner ore, hornblende was noticed. Gold values are reported as being present. Near the camp a little molybdenite was seen with the chalcopyrite. The mineral association definitely points to the deposit being formed at high temperature and therefore at depth.

The exploratory work so far done on this zone is not sufficient to give a definite idea regarding the extent or richness of this interesting occurrence. There appears to be every reason to think that the copper bearing bodies will be lenticular and that sections of the zone will be barren; but there is little doubt detailed work will uncover more showings and might conceivably block out appreciable tonnage of, what under more favorable economic and transportation conditions, might be ore.

This belt which parallels the Dog Lake belt is also believed to continue for some miles in a north east direction towards Churchill River. In the opposite direction the schists are largely replaced by gneisses and this part of the region, which will be described next, is distinctly unpromising.

Nut and English Bays

The large peninsula forming the major part of Moose Point was not studied by the writer, but the shore line 7 to 12 miles from the bay, near its base, towards the southwest was investigated and includes the shores of Nut Point, Nut Bay, and the irregular point between Nut Bay and English Bay. This shore line includes a width of about 6 miles across the strike of the last belt described. The rocks here are predominantly granite gneisses with very minor amounts of biotite schists, dark hornblende gneisses and a few pegmatite dykes. The small amount of schist phases present are almost all confined to the irregular point between English and Nut Bays. These rocks are undoubtedly on the strike of the Moose Point belt of schists and greenstones and are the replacement of these rocks by the invading granitic material.

No sulphides or other indications of valuable metal mineralization was encountered in this section.

THE AMISK LAKE AREA

In 1913 gold was found in the vicinity of Amisk (Beaver) Lake and during the next two years considerable interest was aroused in the region, but during the war it waned practically to extinction. Attention has again been focused on this well mineralized section, chiefly on account of the recently uncovered gold bearing deposit on the property now held by the Amisk Gold Syndicate Limited.

Location and Means of Access

The east side of Amisk Lake lies about 5 miles west of the east boundary of the Province at about latitude $54^{\circ} 30'$. The south shore of the lake is about 65 miles, in a straight line, north west of the town of the Pas, Manitoba, and the east shore is about 12 miles west of the town of Flin Flon, Manitoba. This lake is irregular in outline and has many islands in its northern part. Its north-south length is about 20 miles and its east-west width about half this distance. Across the south part of the lake trends the contact between the southern area, underlain by flat lying sedimentary rocks of Palaeozoic and later age, and the northern area of much older Precambrian rocks. The Amisk region is contiguous with the Flin Flon-Kississing mineral area of Manitoba.

In the early days the lake was only accessible by long canoe routes from the south or south east. Since the building of the Flin Flon branch of the Hudson Bay Railroad a much shorter canoe route, about 20 miles long, has been used from the railroad, but owing to the necessity of making numerous portages it is an arduous one. The Province has this summer commenced the construction of a road from the railroad to the east shore of the lake. This road and boat transportation will make all the present known showings in the vicinity of Amisk Lake easily accessible and will greatly aid in the development of this interesting region.

History and Work Done in the Area

Members of the staff of the Hudson Bay Company and their rivals from Montreal, established posts on Amisk Lake late in the 18th Century and various explorers in their pay make reference to this area in surveys made subsequent to this time. The brigades of York boats of the Hudson Bay Company passed through this lake for many years on their journeys to and from the Churchill River and distant posts reached by this route. Not till after 1868 when the North West Territories were acquired by Canada did any exploration, not connected with the fur possibilities of the region, take place. It was not until 1909 that the first geological reconnaissance of the lake was made, by W. McInnis of the Geological Survey.

The building of the Hudson Bay Railway adjacent to this region afforded easier access and several prospectors entered this district, underlain by Precambrian rocks, hoping for finds similar to the ones then already known in the similar rock terrains of eastern Canada. Late in 1913 free gold was discovered on the north shore of Amisk Lake by the Mosher-Creighton party and much ground was then staked. Owing to 'blanket' staking and the resultant limited amount of work done, little else was found and interest in this section waned. The discovery, late in 1915, of the sulphide bodies on Flin Flon Lake and later in the same summer of the Mandy ore body withdrew interest from the Amisk area.

In 1914 E. L. Bruce of the Geological Survey started mapping in the vicinity of Amisk Lake and during 1915 and 1916 continued this work eastward into Manitoba over a total east-west length of about 65 miles and including a width north and south of about 35 miles of country underlain by Precambrian rocks. The information obtained was published in the Summary Reports of the Survey for

these years and was collected into one report, Memoir 105, (Amisk-Axthapapaskow Lake District) issued by the Survey in 1918. A geological map of this large area, on a scale of 3 miles to 1 inch, is included in this publication. Besides an interesting summary of the early exploration, the geology of this large region is dealt with in considerable detail in this memoir, which is the last published report dealing with the Amisk section. Much more work must nevertheless be done to unravel completely the intricate geological conditions present in this region.

After the war prospectors again returned to Amisk Lake. The high price of arsenic, which prevailed then, proved an added incentive to some as the occurrence of arsenic sulphides in the region was already known. Intermittent staking has taken place from 1924 to the present, and the outstanding discovery of this recent staking period is the arsenic sulphide gold bearing mineral body now under development by the Amisk Gold Syndicate Limited.

The writer, in the spring of 1931, investigated thirteen mineral showings in this area and mapped in some detail the shore geology of about 2 square miles in the vicinity of four of these occurrences. Other showings are reported in the vicinity of the lake, but were not visited by the writer.

General Economic Geology of the Amisk Lake Area

The thirteen mineralized localities investigated are all on or within easy access of Amisk Lake. The northernmost is the Graham claims, about 2 miles north of the north west shore of Amisk Lake. About 3 1/2 miles to the south west of these claims, about 3/4 of a mile ^{WE} east of the bay in the extreme north east part of the lake is the Kent. On the lake shore to the east of this property is the Blue Quartz showing. About 1 3/4 miles further south and about one half mile west of the Kent, on the west shore of the lake is the Prince Albert, the first discovery in the region. A little more than a mile further south and a third of a mile west is the Amisk Gold Syndicate's showing. To the immediate east of this is Gull Island and south of these last two mentioned occurrences the Beaver Group, Bessie Island, Waverley Group and Davenport Houlihan Group. The last two lie a little over 2 miles south of the main showing on the Amisk Gold Syndicate's ground. About 7 miles due east of the Amisk Gold Syndicate property, on the east side of the lake, the Amisk Group and adjacent showings in the vicinity of Wolverine Lake and on Dixon Mine's claims were briefly studied.

Among the Precambrian rocks mapped in the course of this work are volcanics and related ash rocks (tuffs), sediments and various intrusives. The sediments are conglomerates, arkoses, quartzites and slates. The volcanics and sediments are steeply folded and in places strongly sheared. They are intruded by rock bodies of granitic or acid composition of at least two different ages. The older is a pink syenite sometimes rather porphyritic (large crystals of feldspar in a finer ground mass) and forms a considerable proportion of certain sections of the district. The younger is coarse feldspar or quartz porphyry, occurring in comparatively small boss like bodies and dykes. The field evidence is strong that the younger feldspar and quartz porphyries are formed from the same parent molten rock material or magma and are phases of the same rock mass rather than two separate intrusives. The proof of this is believed to be present on Gull Island. In many mining areas of the world, as previously stated, feldspar porphyries seem to be closely associated with valuable sulphide and gold mineralizations. The close connection of the porphyry and the gold bearing mineralization of the area is strongly indicated by the relationships seen on the Graham claims and Gull Island. The recognition of areas of such rocks in other parts of the district may be an important factor in aiding the search for additional mineral bodies of interest. There are also dykes of gabbroidal material sparingly present in the region but at present no particular economic significance is attached to them.

The sulphide-gold quartz mineralization seen on most of the claims has many characteristics in common. In some cases the quartz present is a brittle, glossy white variety with a pronounced conchoidal fracture, on others a more glassy colourless phase with not as pronounced a conchoidal fracture, possibly a less favorable type, is associated with similar sulphides or free gold or both and in certain instances is reported to contain encouraging values in gold. The common sulphides present are pyrite or arsenopyrite or both, but in certain instances a little galena, chalcopyrite or sphalerite or some or all of these were seen. Iron carbonate (siderite) is associated with both the above types of quartz-sulphide mineralization, usually confined to the wall rock of the veins, or in places to wide zones low in quartz and so far not found to contain appreciable values in gold. This mineral easily weathers to iron oxide and these rusty capped zones are very easily recognizable on well exposed rocky areas. A zone, of considerable length, of this nature is found on the shore just east of the main showing of the Amisk Gold Syndicate.

All the metal mineralization seen is of the type considered by most students of the subject, on account of its mineral content, to belong either to the deep or deep-intermediate types of veins. The glassy colourless quartz mineralization often associated with much pink feldspar probably consolidated at a higher temperature and possibly usually deeper in the earth's crust than the white glossy type. The upper parts of these veins, possibly hundreds or even thousands of feet in length have been lost by the deep erosion the country has suffered since their formation.

The influence that structural factors have had in the location of mineral bodies of interest, is clearly seen in the main workings of the Amisk Gold Syndicate.

The panning of the rusty cap of mineralized outcrops has proved a valuable method in locating potentially valuable bodies. The gold is apparently intimately associated in many cases with the iron rich sulphides arsenopyrite or pyrite and on weathering these minerals form a rusty gossan in which the fine gold is scattered. Free gold in quartz occurs on some properties as previously noted.

The widespread occurrence in the Amisk area of quartz-sulphide mineralization and related free gold-quartz mineralization, containing appreciable values in gold, and the geological conditions present give promise of further finds being made in the district. It is quite possible that in this favorable area profitable gold mines may eventually be brought into production. It must nevertheless be remembered that the older well explored mining regions, of a similar nature, have shown that profitable producers, in any one locality, have always been few in number.

In the following sections the various mineral occurrences studied and the geological conditions in their vicinity are described in some detail. These descriptions are based on field observations with little or no assistance from detailed laboratory methods.

Graham Claims

About 2 miles north of the northwesternmost bay of Amisk Lake and about 1 1/2 miles north east of Grassy Lake is a block of nine claims held by R. Graham and staked by him in 1915. The claims are reached by a trail about 1 3/4 miles long starting at the extreme north west end of Amisk Lake. Much bed rock is visible on the claims and fire has cleared off much of the brush and timber. The chief work consists of a shaft 35 feet deep, some shallow rock trenching and much stripping.

The country rock seen is a sheared and in places much contorted conglomerate with impure quartzite phases. The southern contact of a wide granite body is reported as passing through the extreme north east corner of the group and trends south of east.

About a mile south of this contact on the Chicagoff claim is the shaft, sunk on the main showing. This consists of a quartz vein $2\frac{1}{2}$ to 3 feet wide in the shaft, striking N. 60° W. and having a vertical dip. The vein holds its width for about 30 feet in both directions from the shaft and then splits up into smaller veins and stringers dispersed over a width of 3 to 6 feet, and within about 100 feet in both directions from the shaft give place to a few small gash veins. Ten feet north of the shaft is a mineralized belt about 4 feet wide and about 30 feet long. Two similar zones have been uncovered about 450 and 700 feet respectively north west of the shaft. The zone closest to the shaft is about 50 feet long and 30 feet wide and contains three mineralized belts 8, 3 and 2 feet wide respectively. The zone farthest from the shaft is about 40 feet long and 10 feet wide. In all these mineralized bands, irregular, discontinuous stringers of quartz $\frac{1}{2}$ to 4 inches wide form as much as 20 per cent of the total areas.

The quartz in all these veins is greasy looking, semi-transparent, whitish-grey in colour. Associated with it and in greater quantity in the smaller veins is a little pink feldspar, often occurring near the margins of these stringers. Some carbonate and a small amount of pyrite are usually present and in the vein near the shaft free gold was seen. The sheared wall rock of conglomerate and impure quartzite, and the schist inclusions in the larger veins are high in siderite, which weathers to a brown iron oxide. Pyrite cubes from about $\frac{1}{32}$ to $\frac{1}{8}$ inch in diameter form about 3 to 10 per cent of the wall rock with in places knots much higher in this mineral. In places dyklets and small masses $\frac{1}{2}$ to 3 inches across of a pink quartz feldspar porphyry and $\frac{1}{2}$ inch stringers of a related pink cherty material are present in these vein zones. In places the porphyry dyklets pass along their strike into narrow feldspar rich quartz veins.

Near the south west corner of the Valley claim, about 2000 feet north west of the shaft, stripping and some rock trenching discloses two mineralized zones. The wall rock in both localities is a highly contorted and sheared conglomerate which in the veins zones has suffered carbonatization and has been enriched by chlorite. The southern zone is about 70 feet long and 30 feet wide. Quartz veins are present and form about 15 per cent of this zone. The largest vein strikes N. 32° W. and dips vertically. It starts as a stringer at its south east end and widens rapidly and ends abruptly at the north west end of the zone where it has a width of 7 feet. Parallel and shorter veinlets are present and form as much as 50 per cent of bands 1 to 2 feet wide. Feldspar and carbonate are common and a little pyrite is present. About 200 feet north of this showing work has been done on a parallel sinuous zone with a width of about 15 feet. This is exposed for a length of about 30 feet. The vein matter forms 20 to 50 per cent of the belt and is similar in nature to that of the southern zone, except that it is higher in feldspar and carbonate and lower in quartz. Pink cherty material is present in dyklets.

Interesting gold values have been obtained from various parts of the workings on this group of claims.

Kent Group

About $\frac{3}{4}$ of a mile west of the north end of Amisk Lake and a mile a little west of south of Grassy Lake is a block of six claims, 3 deep north and south and 2 wide east and west. One of these is a leased claim. Part of this ground was staked in 1915 by the present holders, A. Davenport, Ed. Fay, A. MacDonald and Tom Brown, and the showing on this property was the second strike made in the Amisk Lake area. The main workings are in the leased claim, Kent 3, which is in the center of the east side of the group. An east-west trail $\frac{3}{4}$ of a mile long leads into this point from the shore of Amisk Lake.

In the center and about 500 feet from the east boundary of this claim, a sixteen foot shaft and trenching discloses a quartz vein lying in the low ground, to the west of an 80 foot high north-south trending rocky ridge. This hill appears to be composed of an altered dark impure quartzite rich in hornblende and is the only rock exposure in the immediate vicinity of the showing. The vein is not clearly exposed but appears to be 4 1/2 feet wide in the shaft, strikes N. 10° E. and dips about 60° to the west. The foot wall is slightly rolling. This vein is exposed along the strike for 65 feet in both directions from the test pit. Along this 130 feet of length it holds its width and is lost under drift cover in both directions. The quartz has vug openings ramifying through it and these are lined by small quartz crystals and filled with fine grained pyrite, the latter forming about 10 per cent of the vein. The quartz is glossy white to whitish-grey in colour, and fractures very easily. A sparing amount of gold is visible. Some of it is present in the solid quartz, but most of the colours seen, were dendritic and dust-like particles on the walls of the druses out of which the pyrite had weathered. Thin films of pyrite are present along some cleavage planes in the quartz. Some arsenopyrite and pyrite are present in the wall rock exposed. At one point, 2 1/2 feet from the foot wall, is a 2 inch width of schist containing 20 per cent of arsenopyrite.

This vein is a strong one and probably continues some distance beyond its present exposed length and will persist at least a fraction of its length in depth. Its commercial possibilities will, of course, depend on the value and consistency of its gold content.

Blue Quartz Group

At the north end of Amisk Lake, a little south east of Grassy Lake and about 3/4 of a mile east of the Kent group, are eight claims comprising the Blue Quartz group. On the shore and 1/2 a mile south of the extreme north end of Amisk Lake on claim Blue Quartz No.2 is a 20 foot cliff stained with iron rust, near the top of which a ten foot wide cut discloses a small amount of mineralization. An irregular 2 foot wide quartz vein with no definite strike or dip and only a few feet long at the surface is disclosed in this workings as well as a few irregular veinlets of quartz. The quartz is glossy white in colour similar to that of the Kent. A few needles of tourmaline are present in these veins and a selvage next to the main vein has as much as 15 per cent of arsenopyrite over a width of a couple of inches. The adjacent rock is heavily impregnated with siderite, which has weathered to a rusty gossan. The adjacent rocks are altered, but fairly massive, interbedded dark impure quartzites and andesitic lavas. Fifty feet south of the pit a narrow dyke of coarse feldspar porphyry is poorly exposed.

It is not known by the writer if other showings have been found on this group.

Prince Albert Gold Mines Limited

In 1913 the first strike in the district was made, on ground held subsequently by the Prince Albert Gold Mines Ltd., by T. Creighton, J. Mosher and L. Dionne. Much of this ground has since passed into other hands. The main showing on this property is on the Prince Albert claim on the north west shore of Amisk Lake, 1/2 mile to the Northwest of Missi Island, at the base of a 1 1/2 mile long point which extends south into Amisk Lake. The main workings are about 50 feet from the shore and 25 feet above lake level and consists of a 75 foot inclined shaft sunk on a quartz vein. A forest fire has destroyed the surface structures and the opening is now filled with water to lake level and material has caved in about the opening.

The shaft was sunk on a vein striking N. 15° E. and dipping about 55° to the west. On the south side of the workings near the surface 4 feet of vein quartz is overlain by 3 feet of mineralized schist and underlain by 4 feet of the same material. Fifteen feet away, on the north side of the excavation the quartz widens to 5 feet, and is overlain by a wedge of mineralized schist 8 feet wide at the surface tapering to 1 foot in width 15' down the dip of the vein. Sixty feet northerly along the strike a pit discloses a few quartz stringers in rusty weathering schist. One hundred feet southerly on the strike a 3 foot width of quartz is exposed and 50 feet further on in the same direction a highly contorted schist with no quartz visible is present.

The vein mineralization consists of rather glassy looking white quartz in which a few specks of free gold are visible but no sulphides were noticed. The bordering schist carries about 10 per cent of quartz in narrow stringers, is impregnated with siderite and carries small amounts of arsenopyrite and pyrite. This wall rock is an altered impure quartzite.

About a 50 foot wide dyke of feldspar quartz porphyry parallels the vein a few feet to its east. The intruded rocks are mostly impure quartzites.

Judging by the lense like nature of the surface exposure of the vein, its persistence in depth may be equally limited, although it is reported to be still present at the bottom of the shaft. Bruce reports low gold values are present, but some spectacular material was taken out of the showing shortly after its discovery. Other parts of these claims may eventually yield more consistent and favorable mineralization.

About 2000 feet south east of the shaft, trenching along the shore of a small island is reported to disclose interesting mineralization. Owing to high water this showing was not studied.

Amisk Gold Syndicate Limited

The Amisk Gold Syndicate Limited hold two groups of claims in the Beaver Lake area, one an irregular group of nineteen claims and one of twelve claims. The main showing now being developed by the syndicate outcrops on claim June 4, part of the first mentioned block, situated near the south end of a southerly trending point, a little more than a mile long and near the base of which is the Prince Albert Gold Mines Limited shaft. This point is on the north west shore of Amisk Lake and north west of Missi Island. The strike of the northerly trending and westerly dipping mineral zone, outcropping on June 4, is inferred to pass on to and near the west boundary of the King Pin claims, ground not held by the syndicate. To the south the strike is inferred to pass across three claims held by the syndicate. To the west on the inferred dip of the body and including ground west of the King Pin group, the syndicate holds an average width of about two claims or about 3000 feet over a total northerly-southerly length of five to six claims or 7000 feet. In the southeasterly part of this group is Gull Island, the geology and mineralization of which will be discussed in a later section. The center of the second group of twelve claims lies about 4 miles a little east of south of the center of the first group and includes a section of country in the south west part of Missi Island. Little prospecting has been done on this block so far and it was not visited by the writer.

Some of the ground in the northern group was originally held by the Prince Albert Gold Mines Limited but was allowed to lapse during the war period. This ground was partly restaked in 1926 by J. A. Cox and G. Chatten. The main showing was uncovered late in 1928 and in 1930 the present syndicate was organized to develop the two groups of claims.

Up to the time of the writer's visit to the property in June, 1931, the main development work had been concentrated on the June 4 claim and consisted of an inclined prospect shaft 100 feet in length down the westerly 50° dip of the mineral zone, a 30 foot one 240 feet 10 degrees west of south of the first on the same zone and sunk at the same angle, as well as stripping and trenching at other localities. The management considered the results of this work is of a sufficiently encouraging nature to warrant the installation of a regular mining and milling plant. Apparently plans are now under way to carry out this step.

General Geology

The general strike of the formations underlying the northern group of claims held by the syndicate trend north a few degrees east and the dips are westerly. This is clearly seen on the west side of Bonanza Bay, the northerly trending bay averaging about 1/4 of a mile in width, which is on the west side of the point on which the prospect shafts are situated. Along this shore the outcropping rocks are mostly interbedded arkoses and slates striking about N. 30° E. and dipping 60° to the west. A small amount of greenstone apparently narrow interbedded flows and a few narrow dark feldspar porphyry dykes are present. All these rocks are fairly massive and unsheared. To the east of these outcrops along the south part of the central axis of this bay are a string of islands chiefly composed of greenstones, most of them definitely volcanoes. Some dark gabbroidal and lamprophyric rocks, probably intrusives, are present on the large northernmost island. On the island south of this one a flow contact strikes N. 12° E. and dips 52° to the west. The small island south of the last mentioned one and due west of the north prospect shaft is underlain by greenstones and a considerable proportion of highly contorted arkosic sediments. The rocks of the northern islands are nearly all fairly strongly sheared, the strike of this structure being N. 7° E. dip 38° to 70° west.

On the east shore of Bonanza Bay the outcrops are volcanic flows with a small amount of interbedded tuffs. The rocks on the southern part of the peninsula were seen to be highly contorted and in certain instances in a few tens of feet the bedding and banding swings through 90° and the dip changes equally rapidly. The same rock types were seen to extend northward onto the Prince Albert Gold Mines Limited property, but in this direction the structures were not closely studied. These rocks are strongly sheared, this structure striking N. 15° E. and dips average 50° to the west. East of these outcrops, in the central part of the peninsula, which averages a little over 1/4 mile wide, the rocks are predominantly quartzites and arkoses with small amounts of conglomerates and slate interbedded with narrow bands of volcanic flows and tuffs. These rocks are occasionally intensely sheared, but shattering is more common and like the former structure is in zones. These structures parallel the shearing along the shore and is but slightly influenced by the direction or attitude of the bedding and banding of the rocks. Narrow shear zones are present strongly impregnated with siderite (iron carbonate) usually associated with a small amount of white glossy vein quartz. These zones weather at the surface to a dark rusty gossan.

The prospect shafts are on the peninsula about 150 feet east of the east shore of Bonanza Bay in the predominantly sedimentary band just described. The outcrops of the mineral zone are a rusty gossan due to the weathering of siderite and sulphides which are both present here.

The outcrops along the east side of the peninsula are rusty weathering, highly carbonated, sheared volcanics of andesitic composition, traversed with the above mentioned vein quartz and resembles the gossan zones previously mentioned. The exposed width of these rusty rocks averages 300 feet but at the north end of the peninsula, about 1/4 mile south of the Prince Albert shaft, exposures on islands east of the shore show the width here to be over a 1000 ft. Although the direction of shearing varies from place to place the common strike parallels that on the west shore of the peninsula and the dips are 55° to 45° to the west.

Due east of the shafts and about one quarter mile east of the shore described is Gull Island, the west side of which is composed of volcanics and the east side mostly feldspar and quartz porphyries. The detailed geology of this island and other neighbouring localities is discussed in other sections of this report.

Main Mineral Zone

As previously stated, the prospect shafts of the Amisk Gold Syndicate are sunk on a rusty gossan zone within the belt, predominantly sediments, which forms the central part of the peninsula. The rusty gossan can be readily panned and yields colours of very fine gold. The shafts are 240 feet apart sunk on this zone which has a strike of about N. 10° E. and dip of about 50° to the west. The north workings is 100' long on the dip. The upper half is an open cut starting at the top of a westerly sloping hill 50 feet above lake level and the floor is the foot wall of the mineral body, the lower half is an inclined shaft close to the foot wall and reaching a point 22 feet below lake level. The lower part of this working has been enlarged towards the hanging wall and exposes a width of about 14 feet of the mineral zone. The upper half of these workings are in gossan, the lower part are in dark impure quartzite or arkose which are shattered and heavily mineralized. The hanging wall is believed to be reached in the lower workings, giving the mineral body a width of 14 feet; but this is not certain and it is possible that this is not the full width of the zone. To the east of the workings a belt of gossan 3 feet wide outcrops and is seen to lie about 15 feet below the main body.

The mineralization of the upper part of the inclined shaft consists of 10 to 15 per cent of sulphides as well as iron carbonate and a little silicification in narrow bands. There is an indistinct contorted banding present and occasionally veinlets of white quartz and pink feldspar not containing sulphides are present. The mineralization at the bottom of the shaft is the same except that irregular veins of greasy whitish grey brittle quartz up to 2 inches wide forms about 15 per cent of the zone.

The south prospect shaft is on the west side of the same hill as the north one and at about the same elevation. The working is about 30 feet long on the dip of the zone and disclosed, when visited, gossan over the whole length except in a few blocks of rock at the bottom which are not completely altered and show mineralization similar to that seen in the upper part of the north shaft. This working shows a 15 foot width of the mineralized body and the hanging wall not yet reached.

The sulphides present are predominantly arsenopyrite crystals usually two or three times longer than broad and having diameters averaging $1/50$ to $1/20$ of an inch. A little pyrite is present in places in irregular grains and as smears along parting planes in the quartz. Assays show traces of lead, zinc and copper so that the minerals sphalerite and galena are probably present in very small quantities and chalcopyrite in an even smaller amount.

Mr. J. M. Iles, managing director of the Syndicate, kindly showed the writer the assay figures obtained at various points in these workings and which show the proportion, by weight, of gold to silver to be about 6 to 10. Some of this silver may very possibly be with the inferred galena which apparently forms about $1/2$ a per cent of the zone. Discounting high assays Mr. Iles considers the average gold content, over all mineralized faces in the two workings, to be 15 dollars to the ton. Detailed work has not been carried out to determine the association of this gold which is not visible in the fresh ore and is found in very fine particles in the gossan. A metallurgical study of the ore indicates that a high recovery is possible without entailing the use of complicated methods of extraction.

Besides the gossan zone previously mentioned as occurring below the foot wall of the main zone at the north shaft, other mineralized areas are known in the vicinity of these workings. A mineralized outcrop occurs 220 ft. a little east of north of the north pit and is possibly part of the main zone. One hundred and twenty feet east of this outcrop, good gold pannings are obtained from a slightly sheared heavily carbonated outcrop of rusty tuffs traversed by quartz stringers. The bedded tuffs here have a strike of N. 70° E. and dip 47° to the north west. There seems to be no possible reason to consider this mineralization as part of the main zone. A small gossan stained outcrop which so far has been unexplored and may possibly be barren, lies 90 feet south west of the south shaft. Gold colours are also obtainable from a gossan zone near the south point of the peninsula and near the wide rusty band previously described which forms the east side of this tongue of land. This occurrence lies about 1/4 of a mile a little east of south of the south shaft.

Owing to a crenulation of the shore the strike of the main zone carries its inferred outcrop into the lake at a distance of about 200 feet north of the north shaft. It may outcrop again on a gossan-stained low rocky point some distance further north. Between the shaft and the shore no outcrops of the mineral body are present, but adjacent outcrops show shearing parallel to it and bedding determinations show that within this distance flows and tuffs swing from a northerly-southerly direction west of the shaft to a northeasterly-southwesterly direction 250 feet north of this working. North of this shaft the ore zone will pass out of quartzite and arkose and enter volcanics. There is every reason to think that there are interbedded sediments a short distance further north which the zone crosses.

It is quite probable that owing to the physical and chemical differences between the sediments and volcanics, the mineral content of the zone will be different in these two rock types. It might conceivably be found that the mineralization will not be as heavy in the volcanics, especially in the tuffs. The evidence seen on the Amisk group property, which is described in a later section, points to such a probability.

The now known length, depth and regularity of the main zone and its high gold content and the management's report of a substantial gold content would seem to indicate the presence of a small ore body. Further development work on this zone may result in the blocking out of appreciable tonnage. Enough other mineralized localities are now known on the peninsula to warrant the hope that further bodies of interest may be located on this property. Little can now be inferred regarding conditions to the west of the shafts, under the lake, but hope is justified that exploration in this direction may result in the finding of other mineralized zones.

Gull Island

Gull Island is in the western part of the northern block of nineteen claims held by the Amisk Gold Syndicate and lies in the channel between the point on which the syndicate has its prospect shafts and the west shore of Missi Island. The island lies about 1/2 a mile due east of the above mentioned showing. It has the shape of a spade, the sharp point being at the north end and is about 1/4 mile long in a north and south direction and its width is about half its length. The island is rocky and stripping and test pitting have been carried out on both sides of it. Outcrops in the central section rise to elevations of about 80 feet above lake level.

Two rock types compose practically the whole island, volcanics of andesitic composition and porphyry grading from a coarse pink feldspar porphyry to a slightly finer grained feldspar quartz porphyry. In both phases the ground mass is distinctly fine grained. The volcanics underlie a little more than a third of the island, forming a belt 50 to 150 feet wide along the west shore and including the point and south west angle of this spade-like piece

of land as well as a band about 100 feet wide extending from the center of this band to the center of the east shore. The remaining two sections of the surface are underlain by the intrusive porphyry. About 200 feet north west of the northernmost point of the island, which is composed of volcanics, is an islelet composed of the coarse feldspar porphyry.

Both rock types are strongly shear. The shearing in the volcanics follows closely the trends of the greenstone-porphyry contacts. On the west shore the shearing strikes a little west of north and the dip is 30° to 50° to the west. Near the north point the shearing strikes north west and dips 65° to the south west. In the east-west central greenstone band the strikes and dips vary considerably and are usually at a considerable angle to the ones on the west shore. The shearing in the porphyry usually corresponds closely to that in the adjacent volcanics. A marked exception to this is present near the south east corner of the island when the strike is about north west and dip 65° to 70° to the south west. One hundred and fifty feet further south at the extreme south east angle of the island, the strike is more northerly and the dip is 80° to the west.

Taking into consideration the presence of small outcroppings of porphyry within the greenstones and the distribution of the two rock types both in plan and elevation, it is evident that the overlying volcanics are merely a thin veneer over an underlying extension of the outcropping porphyry. The strike and dip of the contact between these two rock types is believed to conform closely to the planes of shearing in the overlying greenstones. The vertical thickness of the volcanics along the west shore is therefore believed to be probably not more than 100 feet and in most places nearer 50 feet.

A little mineralization is present in the sheared porphyries on the east side of the island but a much greater quantity is disclosed in the test pits sunk in the sheared greenstones on the west shore. This mineralization strongly resembles the carbonate-sulphide mineralization with a little quartz seen in the shafts of the Amisk Gold Syndicate. It is not as heavy as this latter mentioned type, and gold values although present have so far been found to be low. Like the former occurrence referred to, the mineralization resembles in many ways that seen on the other properties in the Amisk Lake area.

The close association of the mineralization and the feldspar and feldspar-quartz porphyry body on Gull Island is significant and points strongly to this type of alkaline porphyry being the intrusive which produced the mineralization solutions responsible for the carbonate, quartz sulphide and gold bearing bodies of the district. This is in line with the evidence obtained in many metal mining camps of the world.

Beaver Group

The Beaver Group comprises a block of ten claims staked in 1925 by G. Tache and are now held by G. Tache, J. Hyslin, J. Joylc and T. Dupras. These claims adjoin on the north the south eastern part of the northern block held by the Amisk Gold Syndicate. On the south west they tie on to the Davenport Houlihan Group. Claims Beaver Numbers 2, 3 and 5 include the shores of the bottom part of a bay forming a deep indent in Missi Island. The mouth lies $1\frac{1}{2}$ a mile south of Gull Island and the bottom a further $1\frac{1}{4}$ further south. Half way down the west shore of this bay are four rock trenches spaced at irregular intervals over a length of about 1,000 feet. The northernmost lies just north of the north boundary of this group and the other three are on claim Beaver No. 2. These trenches average about 20 feet in length. A little work was also done on the east shore on a point about 1,000 feet from the bottom of the bay. As the writer's work in this locality was confined to the shore outcrops no other work on this group was investigated.

The rocks forming the shores of this bay are chiefly syenite. Narrow bands and shreds of greenstone are present in the intruding syenite. These remnants of greenstone are fairly massive but usually altered to chlorite rich rocks or rocks containing both chlorite and siderite (iron carbonate) in considerable quantities. These bands parallel the gneissoid structure present in the syenite and have a north south strike.

In the second trench, counting from the south, a narrow coarse quartz porphyry dyke cuts the syenite, thus definitely proving that there is a porphyry in the area younger than the syenite. This quartz porphyry is probably part of the same parent mass as the porphyry present on Gull Island. Feldspar porphyry dykes occur on the east side of the bay and are probably also related to the above rock masses.

The trenches above mentioned disclose a low amount of mineralization which occurs in veinlets usually 1/4 to 1/2 inch wide but up to 3 inches wide in places. These cut across the gneissoid structure of the syenite, which forms the wall rock, in no very definite directions. The vein material contains glassy colourless quartz, pyrite and some chalcopyrite. The sulphides are also present in small amounts in the wall rock with siderite. Silicification seems to have occurred along with some of this disseminated mineralization found in the wall rock. Low gold values are known to be present in these rather scantily mineralized trenches.

On the point previously mentioned, 1000 feet from the bottom of the bay on the east side greenstones form the bulk of the adjacent outcrops and are apparently intruded by a small body of coarse dark gabbro which is in turn cut by a 5 foot wide feldspar porphyry dyke striking N. 5° E. and dipping vertically. Parallel but not adjacent to this dyke are two gossan zones 3 and 1 foot wide respectively. A trench discloses the mineralization to be irregular disseminated pyrite and sphalerite and much siderite. Pits 300 feet further south disclose similar mineralization but do not contain sphalerite.

About 500 feet south of the mouth of the bay, on the east shore, are three parallel narrow barren glassy white quartz veins, striking N. 80° E. and having vertical dips. About 1000 feet further south a similar vein with like direction and dip is present.

The mineralization present on the shores of this bay is rather widespread but the work so far done gives no indication of the presence of a concentration of a valuable type. The last mentioned barren quartz veins are believed to be younger than the previously described sulphide-quartz mineralization. This sulphide-quartz type is believed to be probably of the same general age and a phase of the mineralization present on the Amisk Gold Syndicate and other properties in the region.

Bessie Island

About 1 1/2 miles a little west of south of the main workings on the Amisk Gold Syndicate and about 3/4 of a mile north-northeast of Waverly Island is a small island about 1/3 of a mile long. On the mining recorder's plan it is called Boot Island and the claim, including most of it, called Gold Star, but locally it is referred to as Bessie Island. Two rock trenches have been cut on the island, one on the north west side a few hundred feet south of the north end and a second at the extreme south east extremity.

The first trench poorly discloses the relationships present. The southern part of this north-south trending trench appears to cut massive volcanics. In the northern part a heavily iron carbonated and somewhat sheared acid rock, probably an altered porphyry is present. In the lake, 10 feet north of the trench, is an outcrop of quartz porphyry mineralized with a small amount

of fine pyrite and is probably related to the last mentioned rock. A black gossan is present in places and resembles graphite rich material but is in reality rich in extremely fine grained pyrite. This last material is cut by veinlets of pyrite and glassy colourless quartz.

The southern trench lies about 1/4 mile in a southeasterly direction from the last one described. About 10 feet of a dark coloured schist, sheared at N. 20° W. with a vertical dip is disclosed. Along the shearing are knots and stringers of sugary glassy quartz with a little sulphide and narrow stringers of pyrite and pyrrhotite. Outcrops of basic volcanics and a feldspar porphyry are present near this trench.

It is at present not clear if the two trenches disclose parts of the same zone. Possibly the schists present in these two exposures are sheared tuffs interbedded with the volcanic flows seen in the vicinity. Under stress the tuffs would tend to shear more readily than the massive volcanics.

If the compass needle has not been influenced by the pyrrhotite present the N. 20° W. direction of the shearing obtained in the southern trench is noteworthy, as it is a divergence from the general strike of this structure seen on the Amisk Gold Syndicate's ground to the north and on Waverly Island to the south, where it trends a little east of north. The mineralization so far disclosed in these workings is not particularly interesting from the economic point of view.

Waverly Group

What is known as the Waverly group consists of an irregular block of twelve claims and its center point is about the north end of Waverly Island. This island lies in the channel between Missi Island and the west shore of Amisk Lake, about 2 1/2 miles south and about 1/2 mile west of prospect shafts of the Amisk Gold Syndicate Limited. These claims were staked in 1924. During 1930 the Clan Mining Company carried out a prospecting campaign on this group, which included diamond drilling of holes reported to aggregate about 600 feet in length. This drilling was done near the north end of the island. About half a mile south of this point on the west side of the island a fifteen foot deep test pit has been sunk about 60 feet from the shore. Twenty feet east of this working is the west side of a rock ridge which has been explored eastward for 30 feet by a deep rock trench. A few hundred feet east of these workings on the east side of the island is a substantial set of camps. Other work is reported to have been done in this vicinity but was not seen by the writer. Rock outcrops are numerous on this island.

In the vicinity of the test pit and rock trench the rock is strongly sheared and has a strike of N. 10° E. and vertical dip. The rocks present are dark impure quartzites, arkoses and dark slaty rocks. Near the shaft they contain small dark chloritic flaky areas and look more like a highly sheared tuff. The rocks have been highly altered by the impregnation of siderite and their outcrops weather to a heavy rusty gossan. Little could be seen in the test pit owing to it being filled with water, but the mineralization noticed appears similar to that visible in the 30 foot long rock trench immediately to its east. In the trench the rock was seen to be heavily carbonated and silicification is evident in zones 1 to 4 feet wide and makes up about 15 per cent of the rock exposed. In some of these zones fine arsenopyrite form about 5 per cent of their volume. In others pyrite was seen to the exclusion or almost exclusion of the arsenopyrite. At one point in the trench irregular veinlets of barren glassy colourless to white quartz was seen. On the dump carbonated rock containing veinlets of similar quartz associated with fine veinlets of pyrite were seen.

East of these workings an appreciable width of fine arkosic and slaty sediments showing little or no mineralization are present. Further east in the vicinity of the camps and the neighbouring east shore of the island, the sediments give place to massive volcanics of an andesitic composition. Just south of the camps these volcanics are cut by a 1 foot wide dyke of fine grained material, possibly a chilled phase of porphyry, containing some pyrite. A few tens of feet to the east on the small point south east of the camp a few small lenses of quartz are present and have an east west strike.

The shearing present is strong and has an appreciable width and probably extends for some distance along the strike. It was probably intersected by the drilling previously mentioned, the results of which are not known to the writer. The sulphide mineralization noticed is not heavy or in well defined zones and unless assays show appreciable and consistent gold values the work so far done does not disclose a body of commercial interest. If consistent values are present this zone of shearing or others that may be present in its vicinity may have possibilities.

To the immediate east of Waverly Island and about one quarter of a mile away is a northerly trending point, part of Missi Island. This point is about 1 mile long and about 1/4 mile wide. On its east shore about one third of a mile from its northern extremity and about half a mile east of the camp previously mentioned is a small bay bounded on the east by a narrow northerly trending rocky point and is on claim - Waverly No. 2. The north and western side of this rocky point is mostly composed of a massive volcanic flow of andesitic composition, dark feldspar porphyry outcrops further south. A 20 foot long east-west trending rock trench near the north end of this point discloses a 10 foot width of the volcanic rock bounded on both sides by porphyry. A little shearing is present in the porphyry to the east of the greenstone, strikes north and south and dips 80° to the east, shows a little chlorite alteration and contains a little disseminated pyrite. In the greenstone band is an irregular vein of white glassy smooth fracturing quartz containing coarse scattered aggregates of galena, sphalerite, chalcopryite and pyrite. Chloritic schist material and a little pyrite forms the immediately adjacent wall rock. The general strike of this vein is northwest-southeast and dip irregular. It was seen to pass under the water of the small bay but does not extend eastward into the porphyry. The greatest width of this vein noted was 1 foot. An east-west 40 foot long trench, forty feet south of the last discloses only feldspar porphyry.

This quartz-sulphide vein does not appear to lie along a strong break, so probably has little length. Although its mineral content is varied the percentage of metal sulphide noticed are low and unless appreciable gold is present this mineralization with a high content of white glassy quartz is not particularly interesting from an economic point of view.

Davenport-Houlihan Group

Half a mile east of the showing on claim Waverly No. 2, on the west shore of Missi Island is the west boundary of a block of four claims, named the Sky, Sun, Star and Moon. These were staked in 1930 by A. S. Davenport and P. Houlihan. At the time of the writer's visit two trenches, each 20 feet in length, partly excavated in rock had been completed on the Star claim, the south western one of the block. These trenches are at right angles to the trend of the formations and shearing present. The exposed rocks were scattered feldspar porphyry containing narrow bands of green schist. The schist and shearing strike N. 15° E. and the dips are vertical. A little silicification is noticeable at various points and pyrite, which in places amounts to about 5 per cent of the rock volume, is irregularly distributed in the rocks exposed. A short distance to the west of the trenches a coarse massive quartz feldspar porphyry is exposed in small outcrops.

This work discloses no valuable mineralization but the shearing is fairly strong and is probably part of a zone of some length.

Amisk Group

About 7 miles due east of the main workings of the Amisk Gold Syndicate Limited there is a block of thirty-seven claims known as the Amisk Group. These holdings have a north-northwest length of about 2 1/4 miles and a maximum width of about 1 1/2 miles. The west boundary of the group follows the north-northwest trending east shore of Amisk Lake, the northern part includes the extreme south end of Wolverine Lake and the north east boundary borders the north west part of Mosher Lake. Mr. Alex Hutcheon of Prince Albert is a member and secretary of the group which has held this ground for some years. Quite a little work has been done on the claims investigated by the writer and consist of stripping, rock trenching and a tunnel over 30 feet long.

The main showings are situated on the Gull and Loon claims in the center of the west side of this group. At this locality a prominent rocky ridge about 1/2 mile long, almost devoid of vegetation and part of the east shore of Amisk Lake, trends north 30° west. Both ends of this ridge pass under the waters of the lake. The surface of this hill is composed of an assemblage of volcanic flows and related ash rocks (tuffs). Their strike and dip are hard to determine but are believed to strike 10 to 25 degrees west of north and dip vertically. The flows are mostly dark green andesites but a small percentage of grey fine grained rhyolites are present. Over an east west distance of 700 feet from the lake shore the volcanics have suffered shearing at intervals. This structure, which is not intense, has a strike of from 10 to 20 degrees east of north and a vertical dip and angles across the bedding of the volcanics. For a few hundred feet east of this belt the rocks are massive and unmineralized.

Along the shear zones and also traversing the more massive rock are narrow ramifying irregular discontinuous quartz veins. These form up to 10 per cent of zones 2 to 8 feet wide but form less than 1 per cent of the 700 foot wide belt in which they occur. The length of these vein zones vary from a few feet to 150 feet. A great deal of iron carbonate (siderite) has been introduced with the quartz mineralization and the weathered rock surface is stained with iron rust over the whole width of the belt. This is more intense and the quartz mineralized zones are more common at the west boundary of this belt over a width of about 200 feet. Into this section a tunnel about 30 feet long has been driven eastward from the lake shore. The wall rock of the tunnel is a fairly massive andesite heavily impregnated with siderite and traversed by irregular quartz veins. On one side of the tunnel over a length of 20 feet, seven irregular quartz veins were noted having widths of 3/4 to 3 inches and aggregating a width of about 15 inches of vein quartz over this distance.

The vein quartz has a greasy lustre, is white in colour, and contains a little feldspar, carbonate and a small amount of pyrite and arsenopyrite in disseminated grains. Films of pyrite are also present along fracture planes in the quartz. The veins often have narrow selvages high in arsenopyrite with some pyrite and small quantities of these sulphides are present in the adjacent wall rock.

A different type of mineralization is to be seen in a pit sunk on a narrow width of shattered rhyolite about 100 feet south east of the tunnel. This rock is mineralized with about 10% of fine grained pyrite in small smear like masses along the shatter planes. A few quartz carbonate stringers are present but the rhyolite shows little alteration by the iron carbonate solutions.

It is interesting to note that the mineralization of any importance is confined to the flow rocks and is not found in the ash rocks. A width of at least 150 feet of these fragmentals is found south west of a line trending south 30° east through the portal of the tunnel. The shearing apparently was only able to develop openings for the mineralization solutions in the more brittle dense rocks.

The vein quartz and immediately adjacent mineralized selvages are known to carry substantial values of gold. A sufficient concentration of this mineralization over mining widths has not been indicated so far at this point. Nevertheless the presence of this mineralization is significant and if more favorable structural and wall rock conditions are eventually found in this locality, ore might be uncovered.

In the Vicinity of Wolverine Lake

About 1 1/2 miles north of the main showings on the Amisk Group on the narrow north and south trending tongue of land to the west of the south part of Wolverine Lake are massive andesitic volcanics having a strike of north 20 to 30 degrees west and a vertical dip. The top of these flows are believed to face west. In places a little shattering is present and has a northerly strike and apparently vertical dip. These zones are 20 to 100 feet long and 3 to 15 feet wide, are somewhat carbonated and traversed by a few narrow stringers and irregular masses of quartz up to 1 foot wide. Associated with this quartz which is present in small quantities a little pyrite and arsenopyrite is present. The mineralization is similar to that seen on the Amisk Group's main showing but is in much less quantity.

Dixon Mines

A block of 8 claims was staked in about 1924 by Joe Collet for a group known as the Dixon Mines. These claims include a number of the islands at the eastern entrance of the channel bounding Missi Island on the north. Their east boundary lies about half a mile west of the west boundary of the Amisk Group's holdings. At the extreme north end of an island about 3/4 mile long and a little south of west of the tunnel workings on the Amisk group the writer investigated a showing on which some work had been done. In a prominent outcrop of green syenite, which had suffered some shattering, some rock blasting disclosed a sinuous quartz vein having a width of 3" to 6", a general strike of North 50° West and dip of 80° North east. The quartz is greasy white and similar to that found on the Amisk Group's ground half a mile to the east. A little siderite, green chlorite, chalcopyrite and pyrite is present in the vein. A selvedge 2" wide of green serpentized material separates it from the much less altered green syenite country rock. A little siderite was also evident in the selvedge wall rock.

No strong vein zone is here indicated and the occurrence is merely of interest as another occurrence of sulphide quartz mineralization in this section of the Amisk Lake area.
